

81-7

C-CORE

Data Report

Nearshore Surface Current Delineation
Cape Hatt 1980

Ernest M. Reimer

May, 1981



NEARSHORE SURFACE CURRENT DELINEATION

CAPE HATT 1980

Ernest M. Reimer

This work was carried out as a joint undertaking of the Baffin Island Oilspill (BIOS) project and C-CORE.

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C-CORE

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NEARSHORE SURFACE CURRENT DELINEATION, CAPE HATT

As an adjunct to the major in-situ oceanographic work, a small study was undertaken to delineate the nearshore surface circulation in bays 9, 10, 11 and 12 at the BIOS experimental site. This work was carried out with the aid of John Buckley (PetroCan) and B. DeLange Boom (Seakem).

METHODS:

Streamers of plastic surveyors tape were tethered at depths of 0, 2 and 4 metres on a grid of stations in the area of interest (see Figure 1). Small bottle floats on rock anchors were used. The 3 metre length of tape having a density greater than seawater would stream in the direction of the current at a vertical angle which reflected the current intensity (Figure 2).

The direction and estimated current magnitude were "read" from these stations either from a boat or from a helicopter (boat being preferable).

The deep tapes were not always visible; turbidity and surface agitation precluded observation in some cases. Estimates of current magnitude were crude at best and are generally only applicable to the surface tape since the vertical angle on deep tapes was not easily resolved. Current magnitude was recorded as:

Nil - tape angle $> 60^{\circ}$ below horizontal

Weak - tape angle between 60° and 45°

Moderate - tape angle between 45° and 10°

Strong - tape angle $< 10^{\circ}$

The current magnitude correlation was based on towing tests in which the approximate velocity calibration was: (angle indicated is below horizontal)

$60^{\circ} = 1.5 \text{ cm/sec}$
 $30^{\circ} = 3 \text{ cm/sec}$
 $10^{\circ} = 10 \text{ cm/sec}$

RESULTS

The observational data is presented in Charts 1 to 24. During much of the time winds were light or nil. Vertical incoherence in the water column was a notable feature for many of the "readings" eg. Charts 6, 14 and 16. In some cases, this incoherence lends itself to interpretation; for example, in Bay 11/12 Chart 19, the pattern appears to suggest surface flow into the bay and deep flow out of the bay.

Observed surface currents in Ragged Channel appear to flow north/south, generally sweeping along bays 9 and 10 and swinging through bays 11/12 (eg. Charts 20 and 21). A weak eddy in bay 10 and bay 11/12 is suggested in some readings (eg. Chart 10). Drogue work carried out during the same period by J. Buckley and R.B. DeLange Boom should confirm the presence of these eddies. The data will lend itself to more meaningful interpretation when co-ordinated with other environmental and oceanographic data collected on the site.

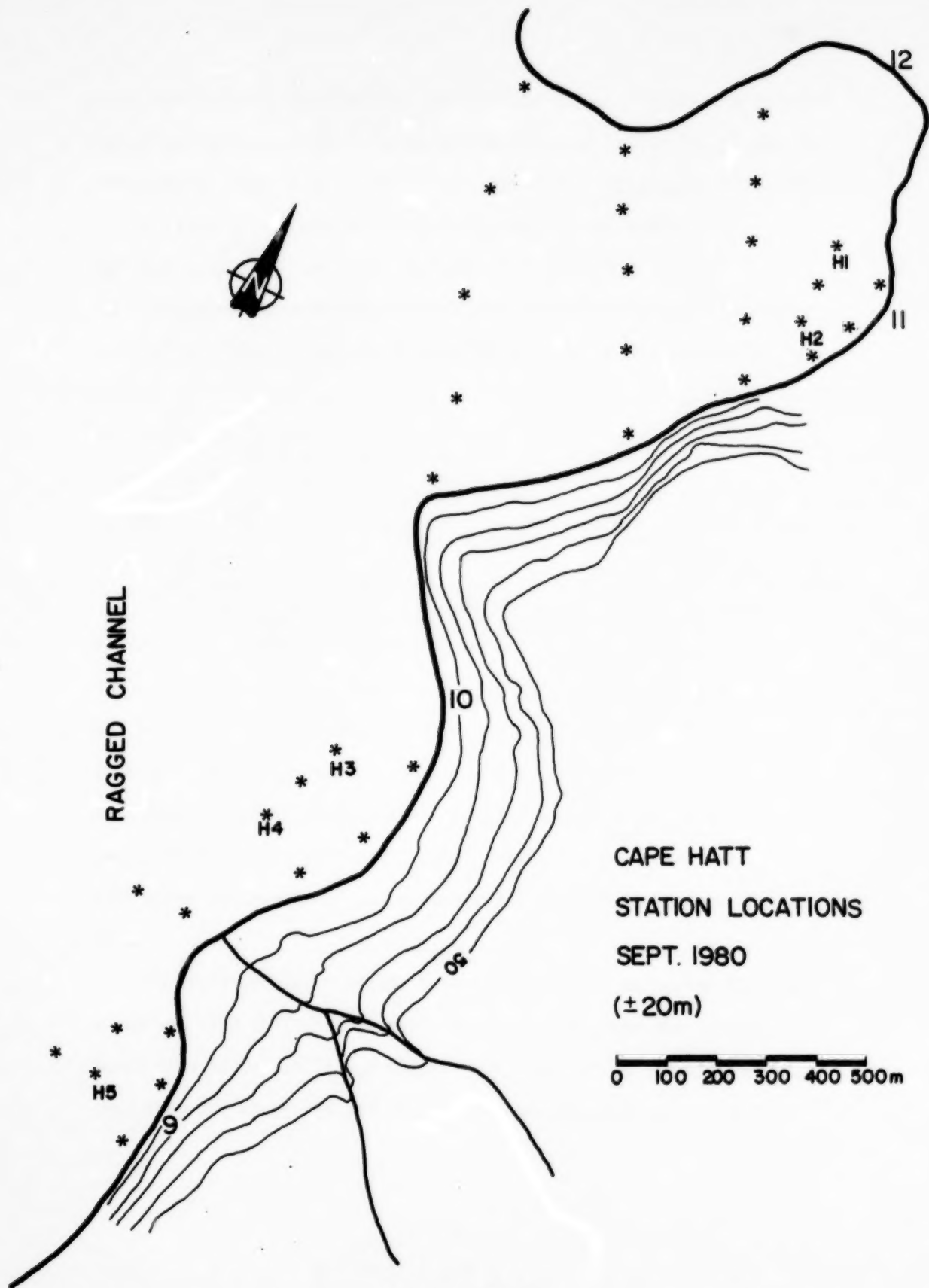
On September 10, ~ 14:00, after several days of southerly winds, an abrupt wind shift to the east apparently reversed the surface layer flow in Bay 11/12 and propelled a distinctive "scum" line away from the shoreline and out of the bay over a matter of an hour

(later examination indicated that this was an accumulation of floating filamentous algae). We were able to document this event as an excellent indication of surface layer drift such as would apply to oil slick movement in the area. Chart 24 indicates a velocity of about 1 km/h (.3 m/s) with some angular rotation. Wind data from the shoreline weather station in bay 12 indicated that the easterly wind was about 3-6 km/h veering to NE by 15:00 hours.

DISCUSSION:

Two general observations can be made at this time:

- (1) The vertical coherence for currents at depths between 0 metres and 4 metres is low.
- (2) There is a more or less continuous, streamlined, low-velocity circulation parallel to the coastline.



CAPE HATT
STATION LOCATIONS
SEPT. 1980
($\pm 20\text{m}$)

0 100 200 300 400 500m

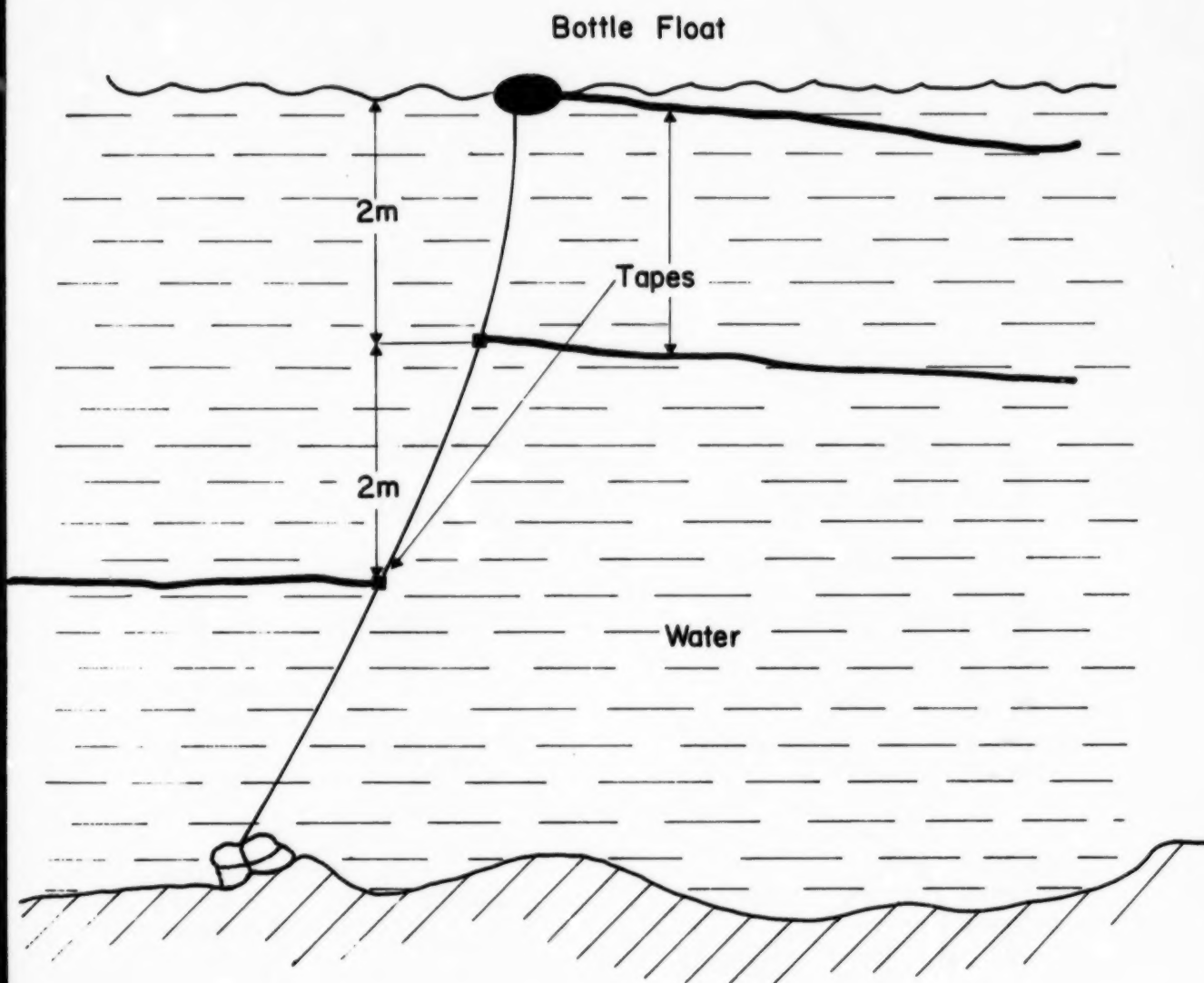


Figure 2. Typical Tape Deployment

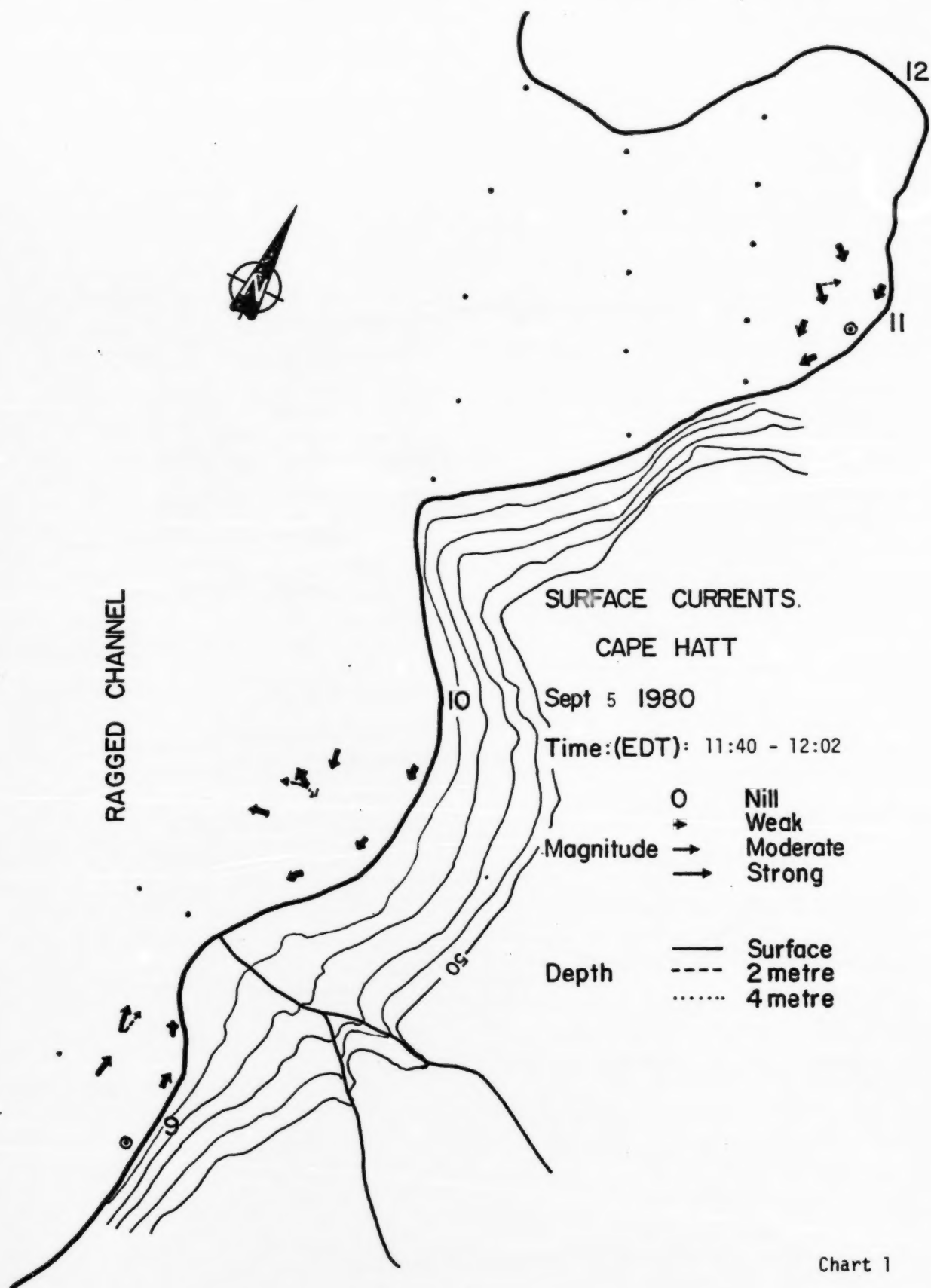


Chart 1

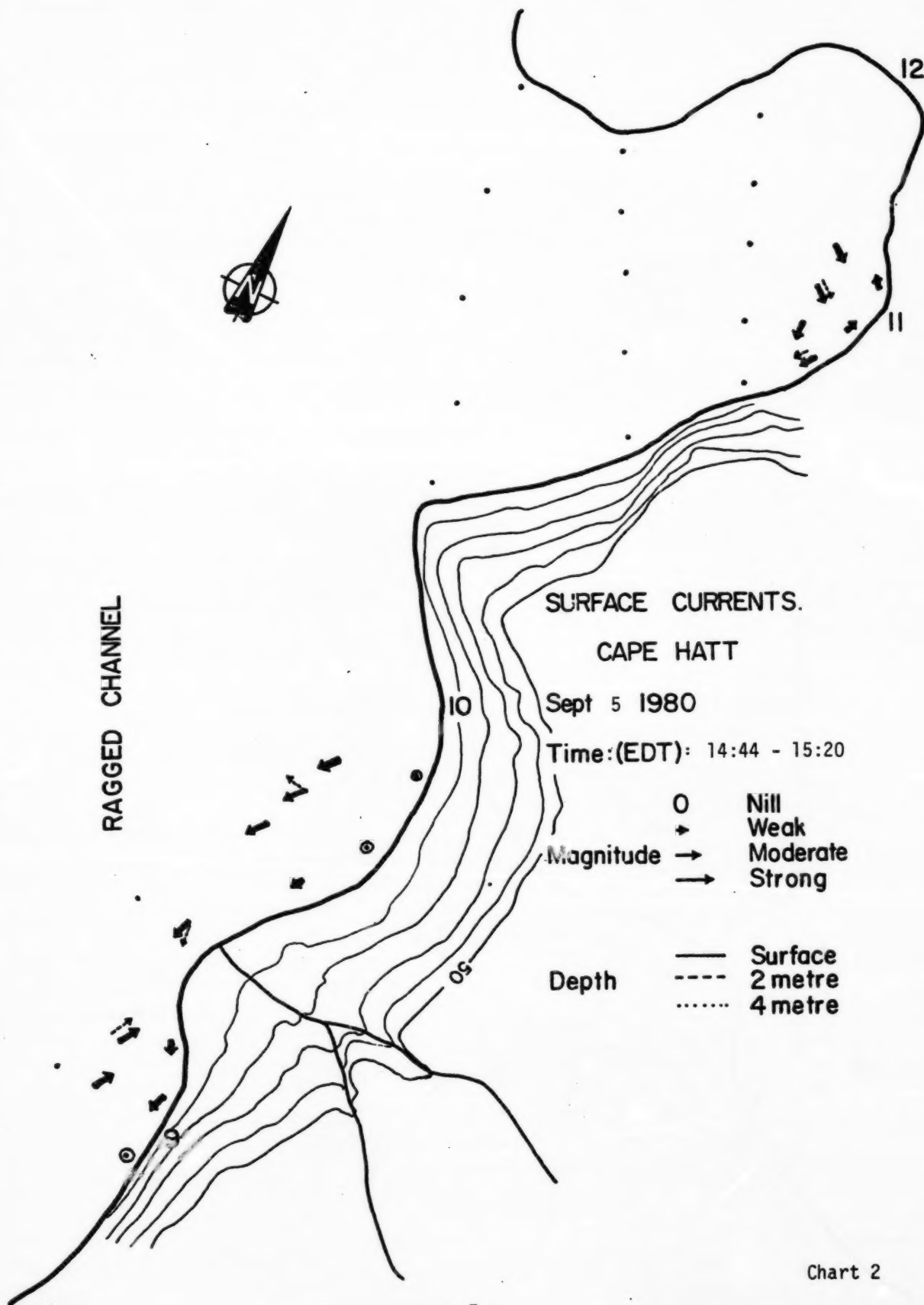
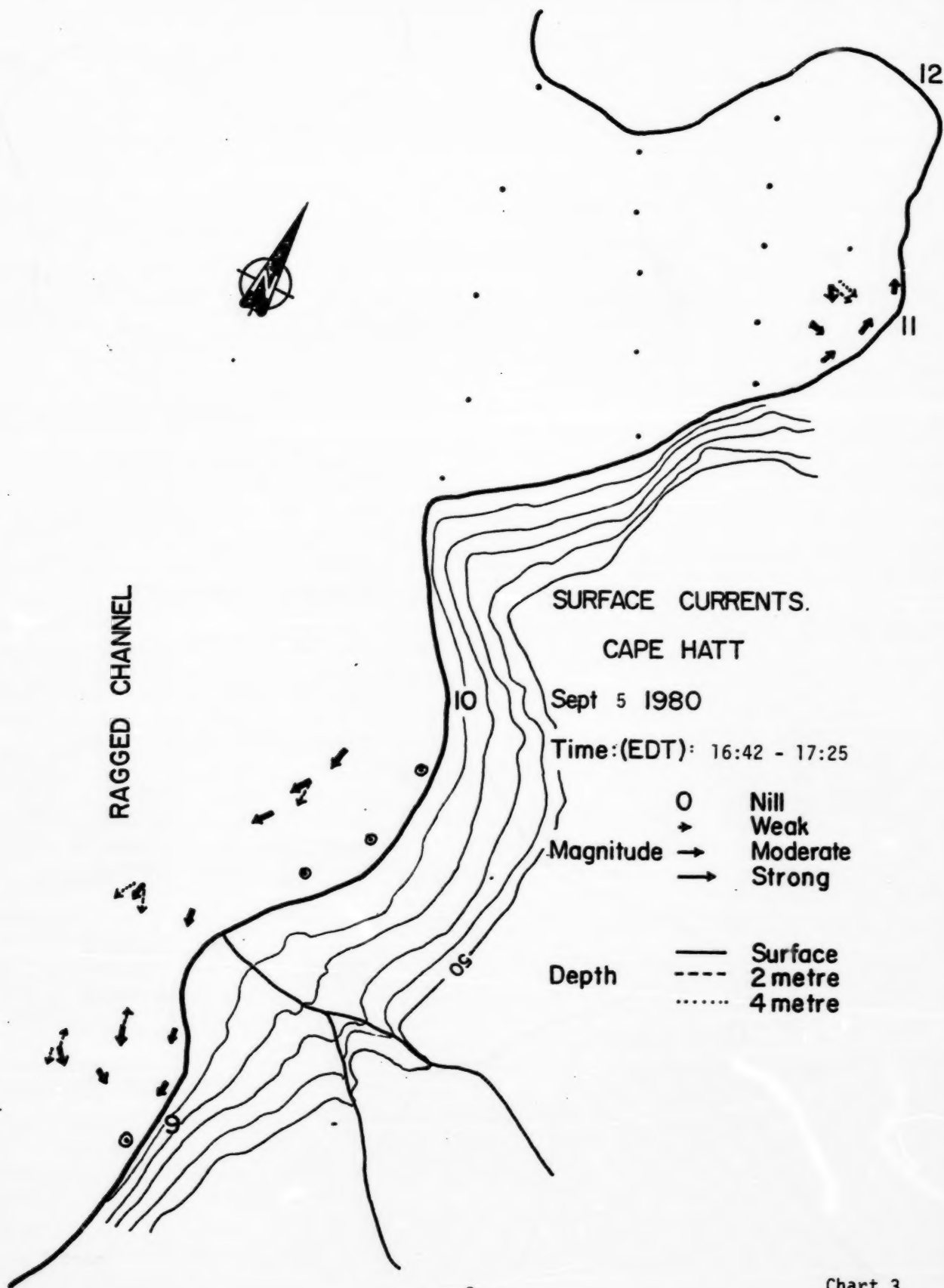


Chart 2



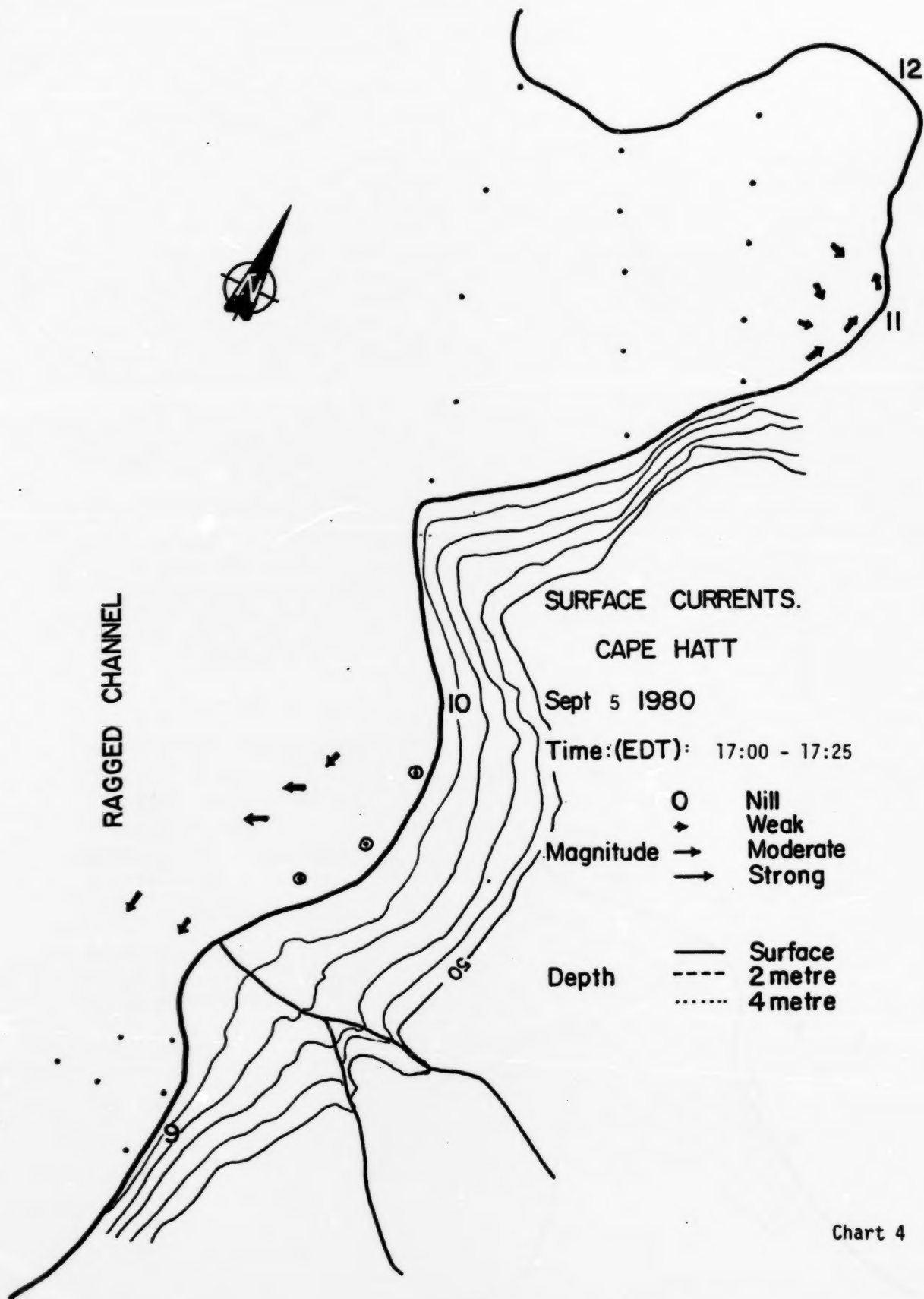


Chart 4

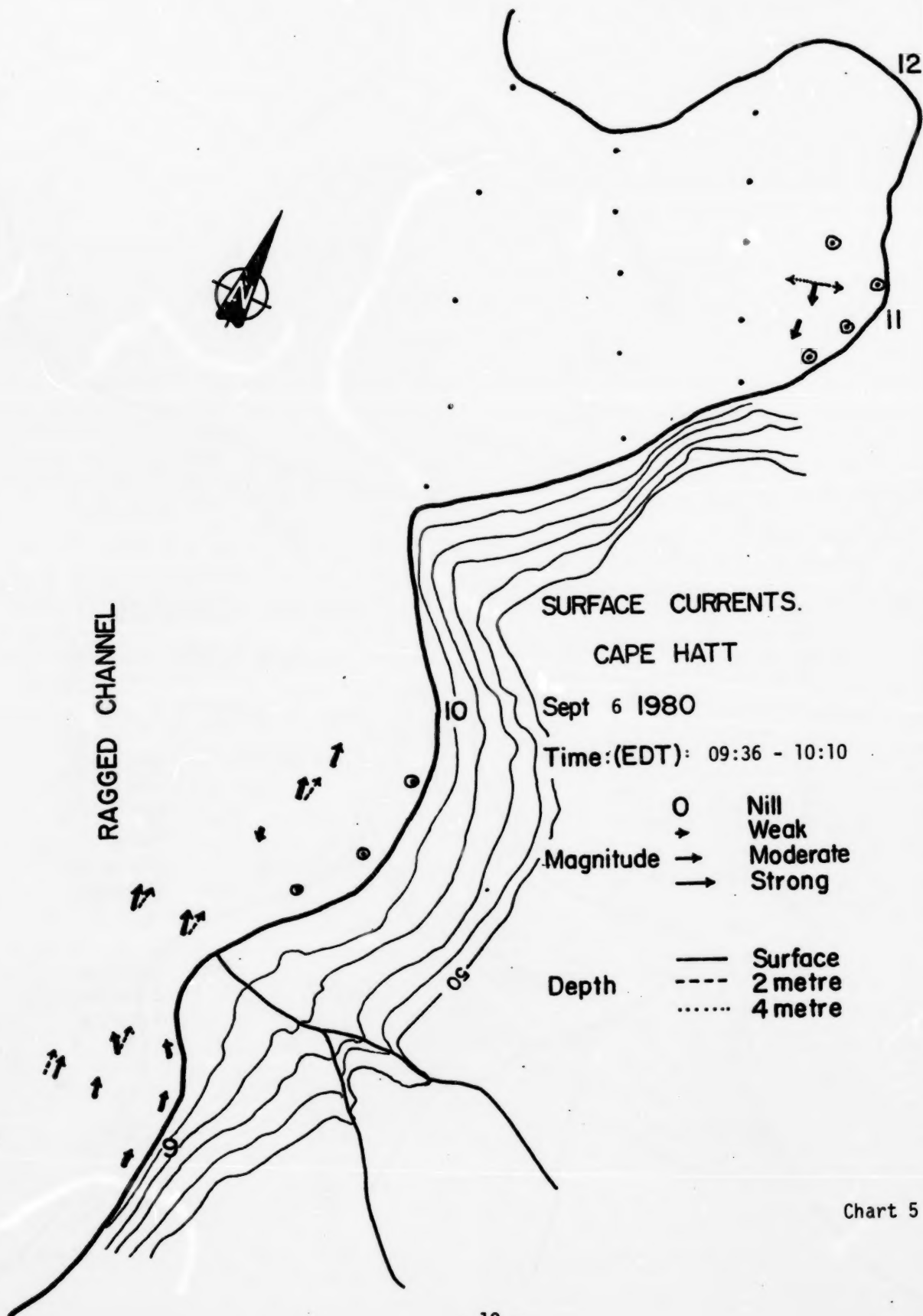


Chart 5

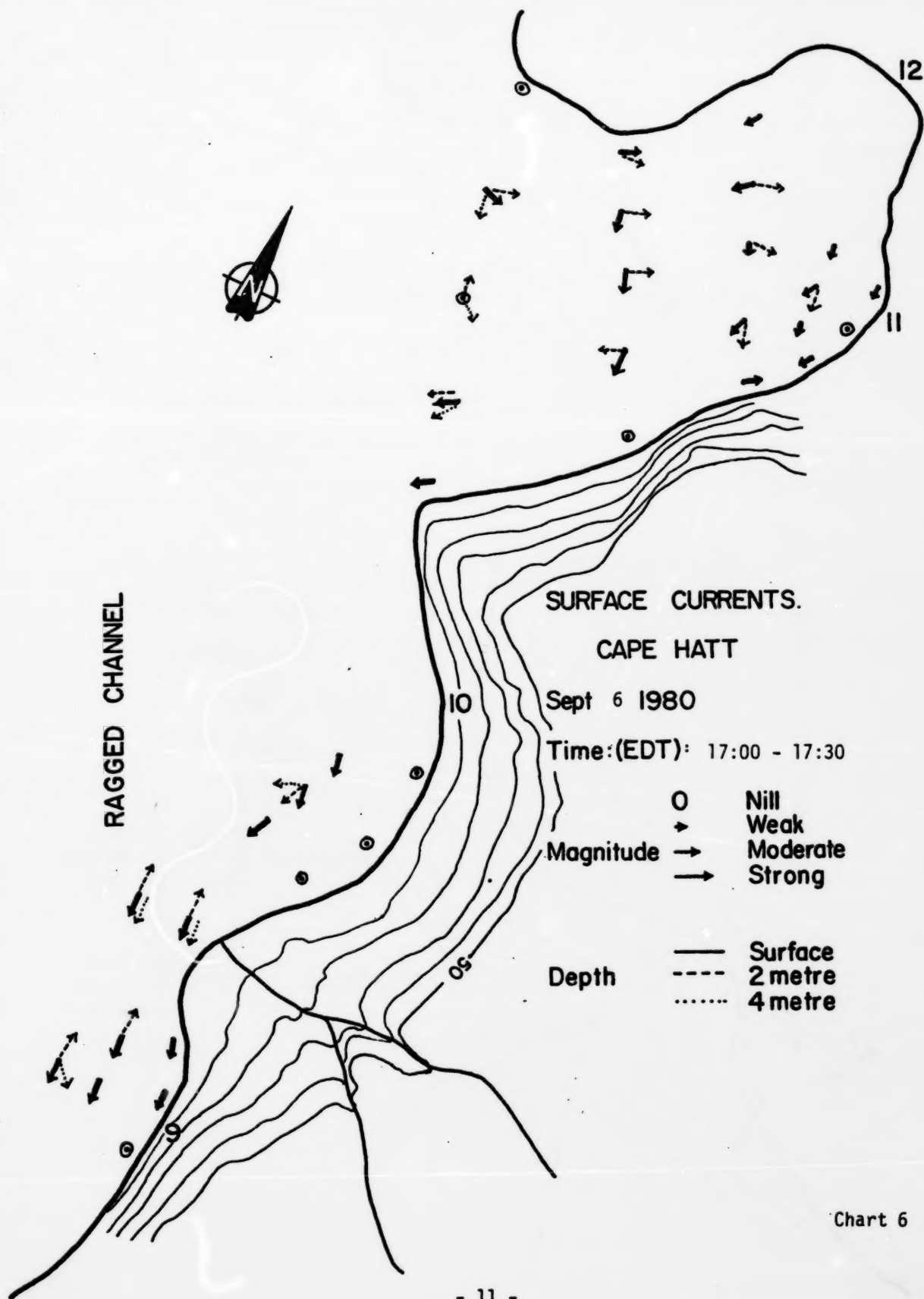
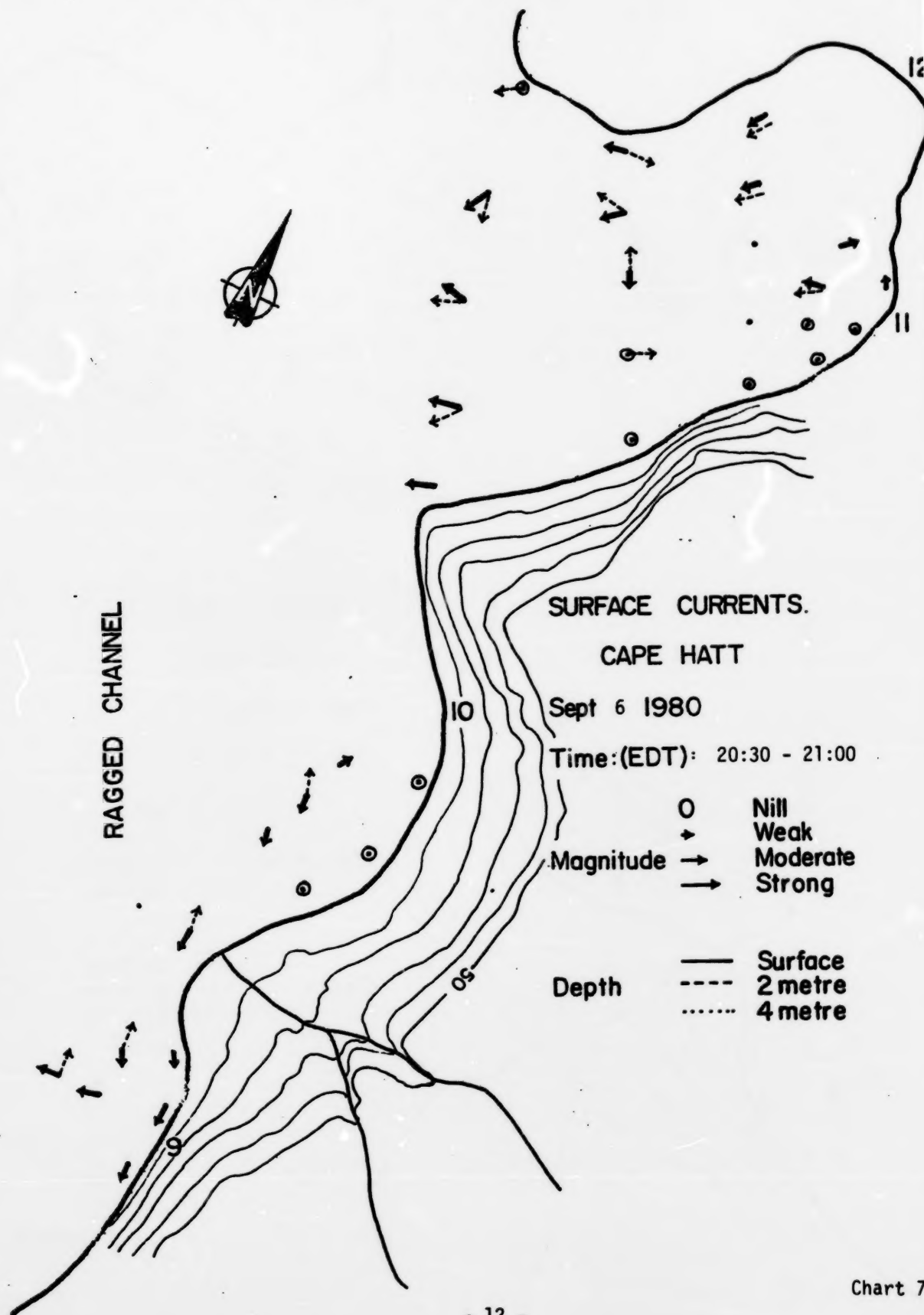


Chart 6



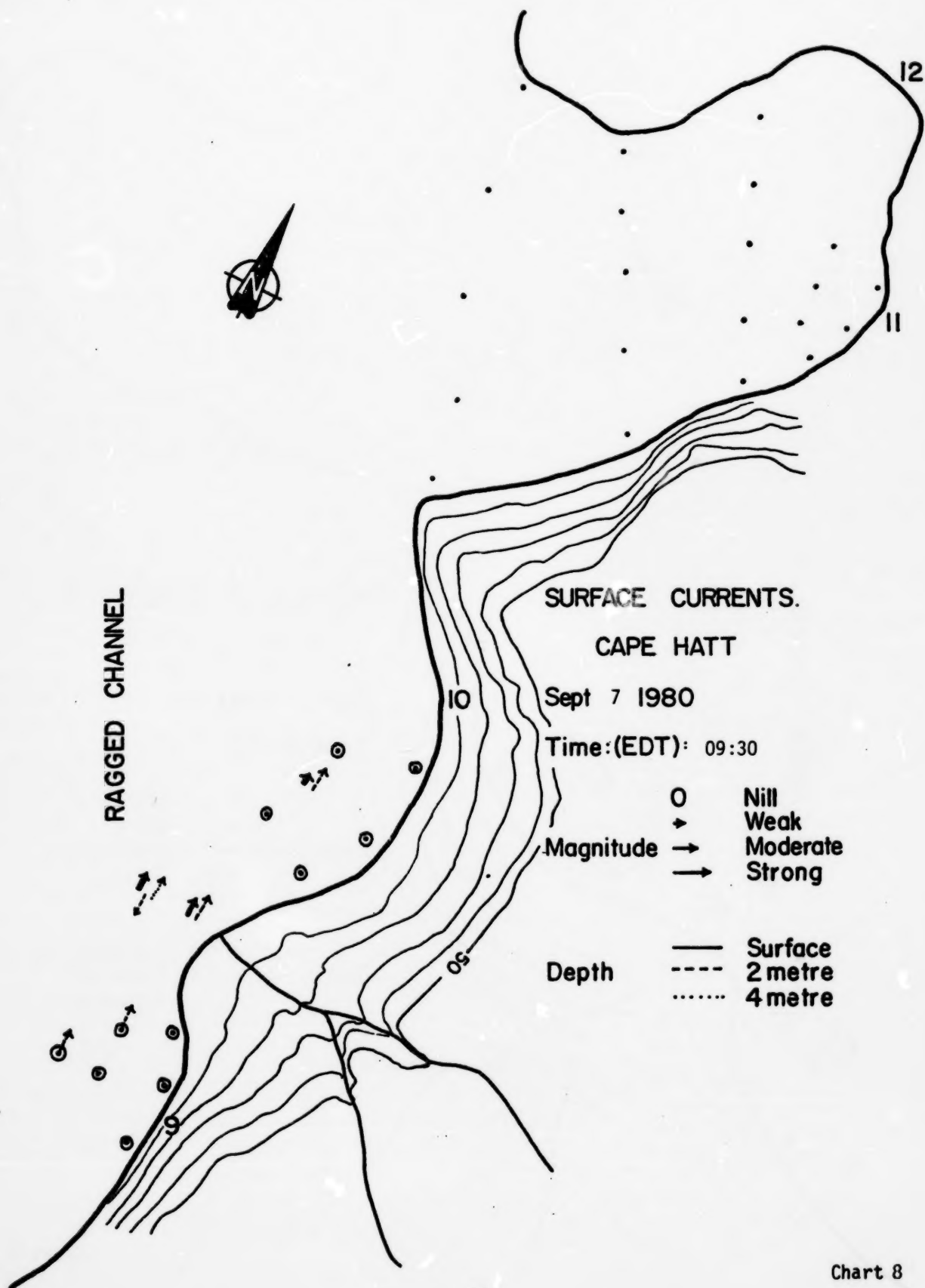
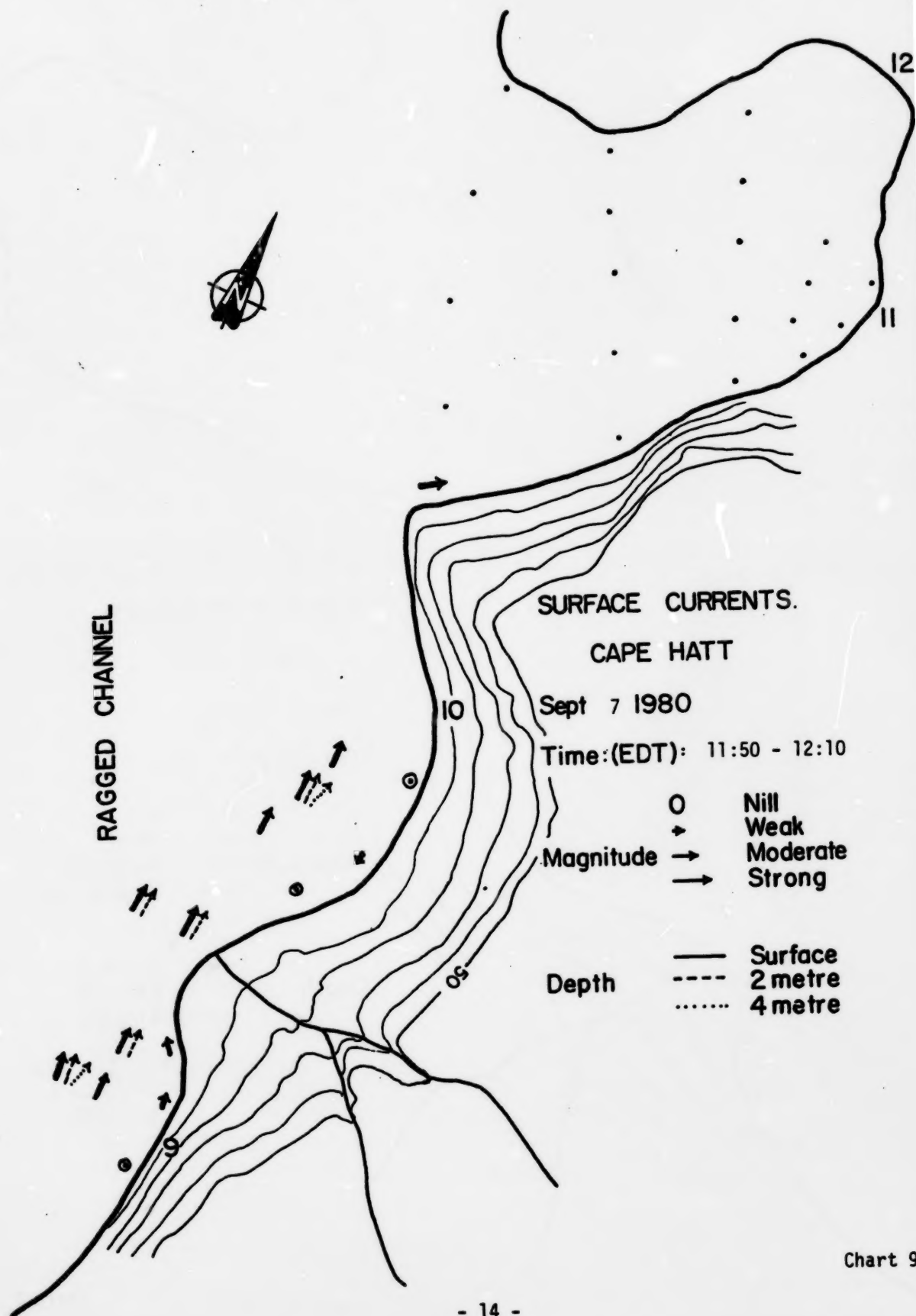


Chart 8



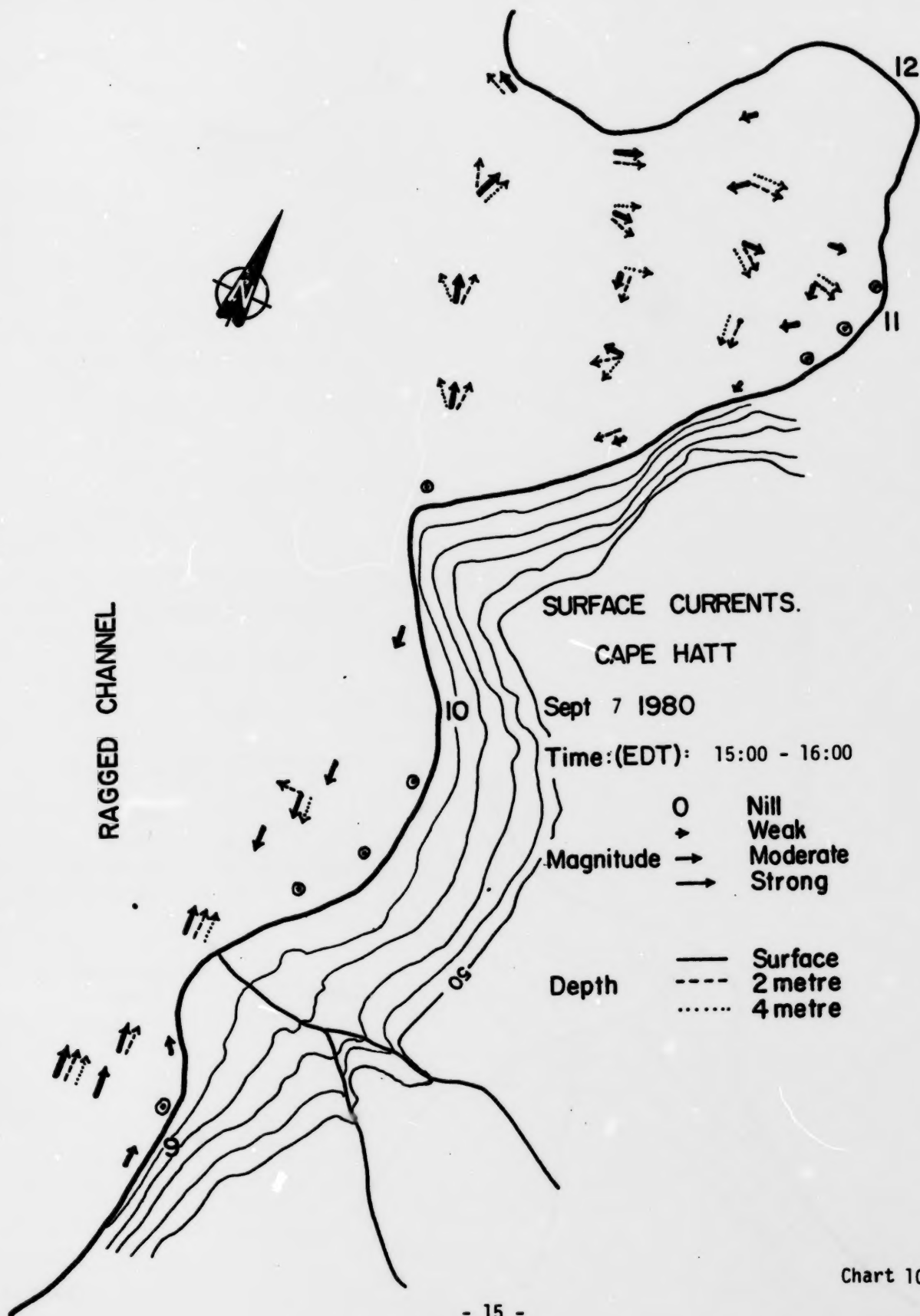
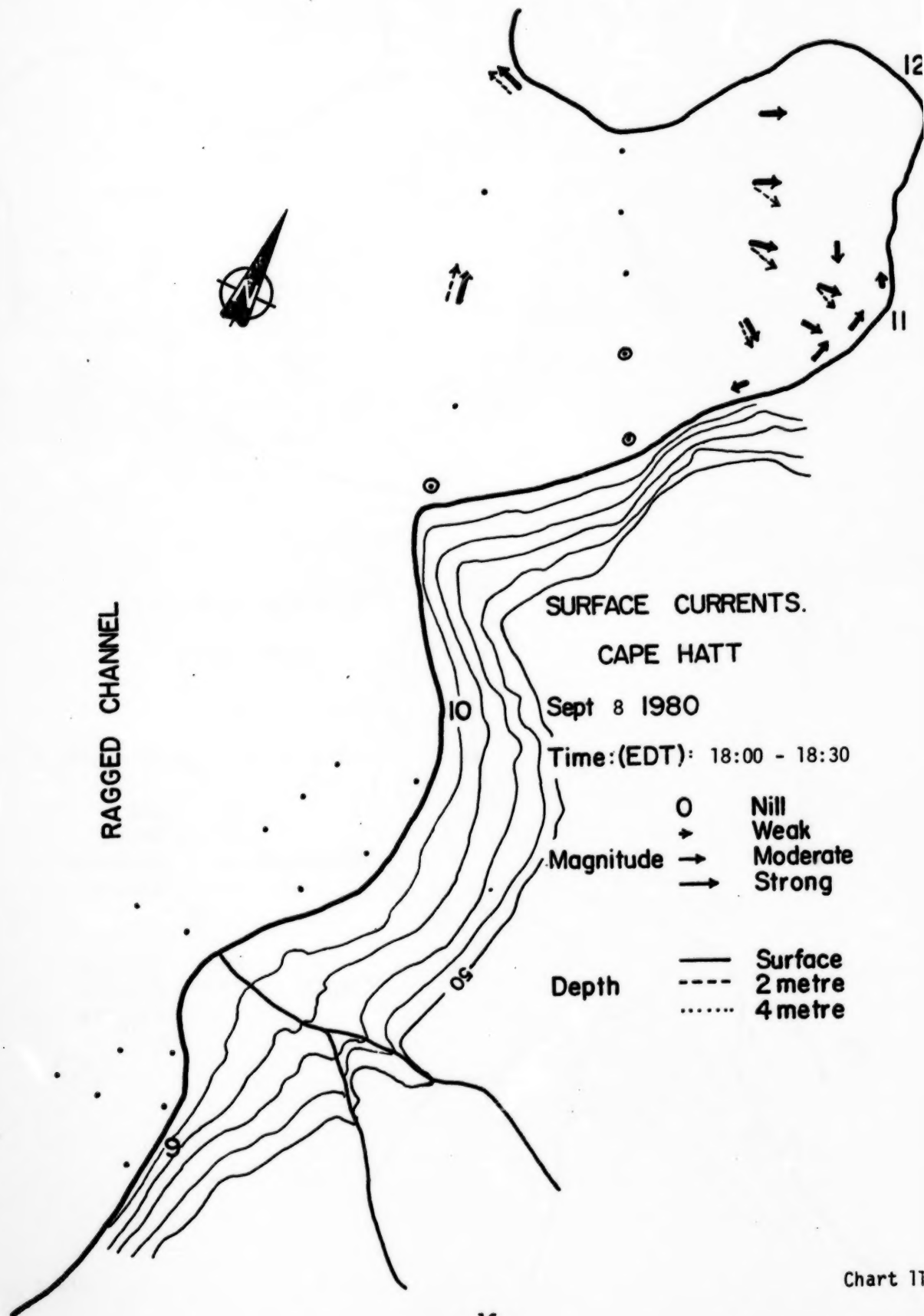


Chart 10



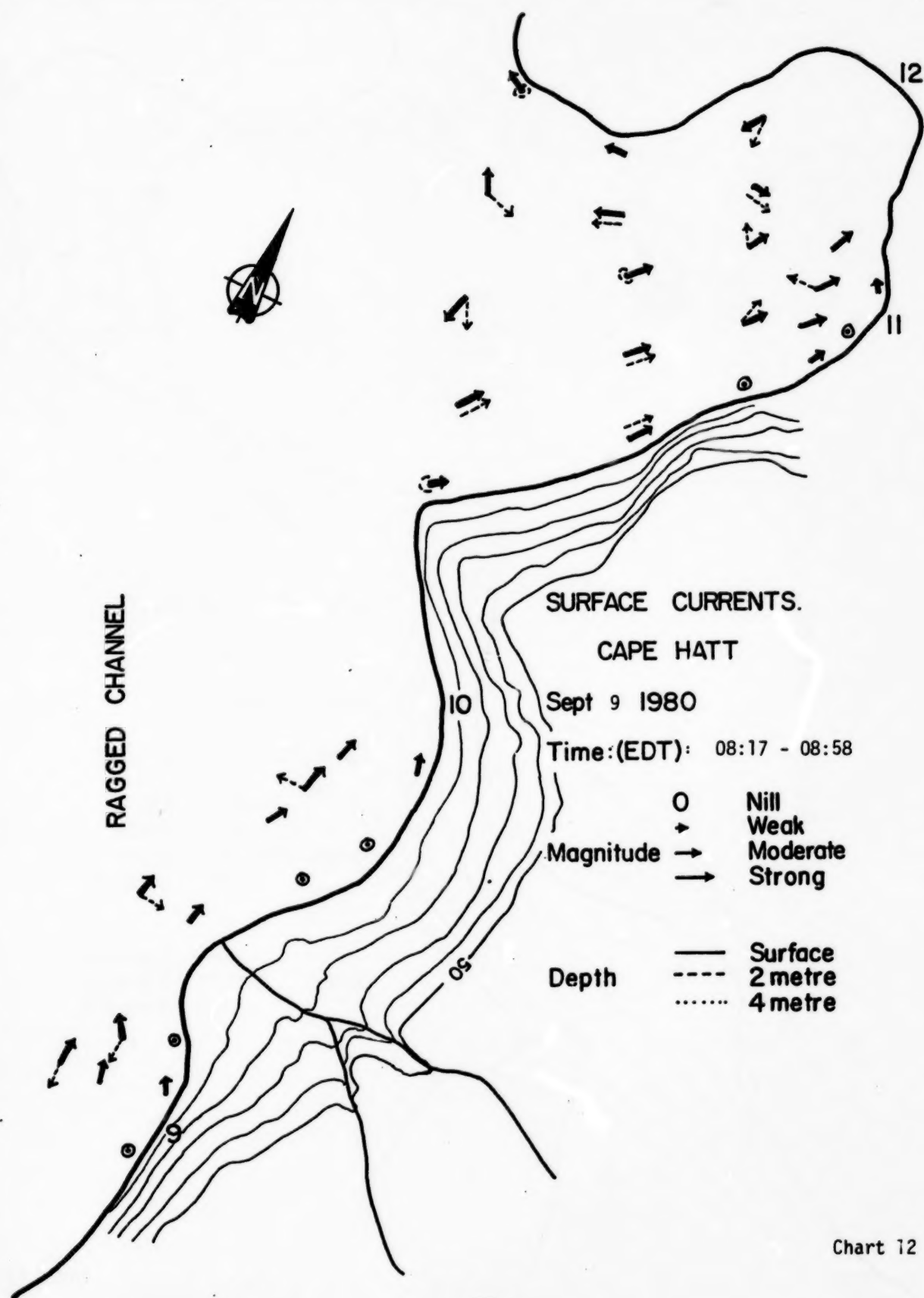
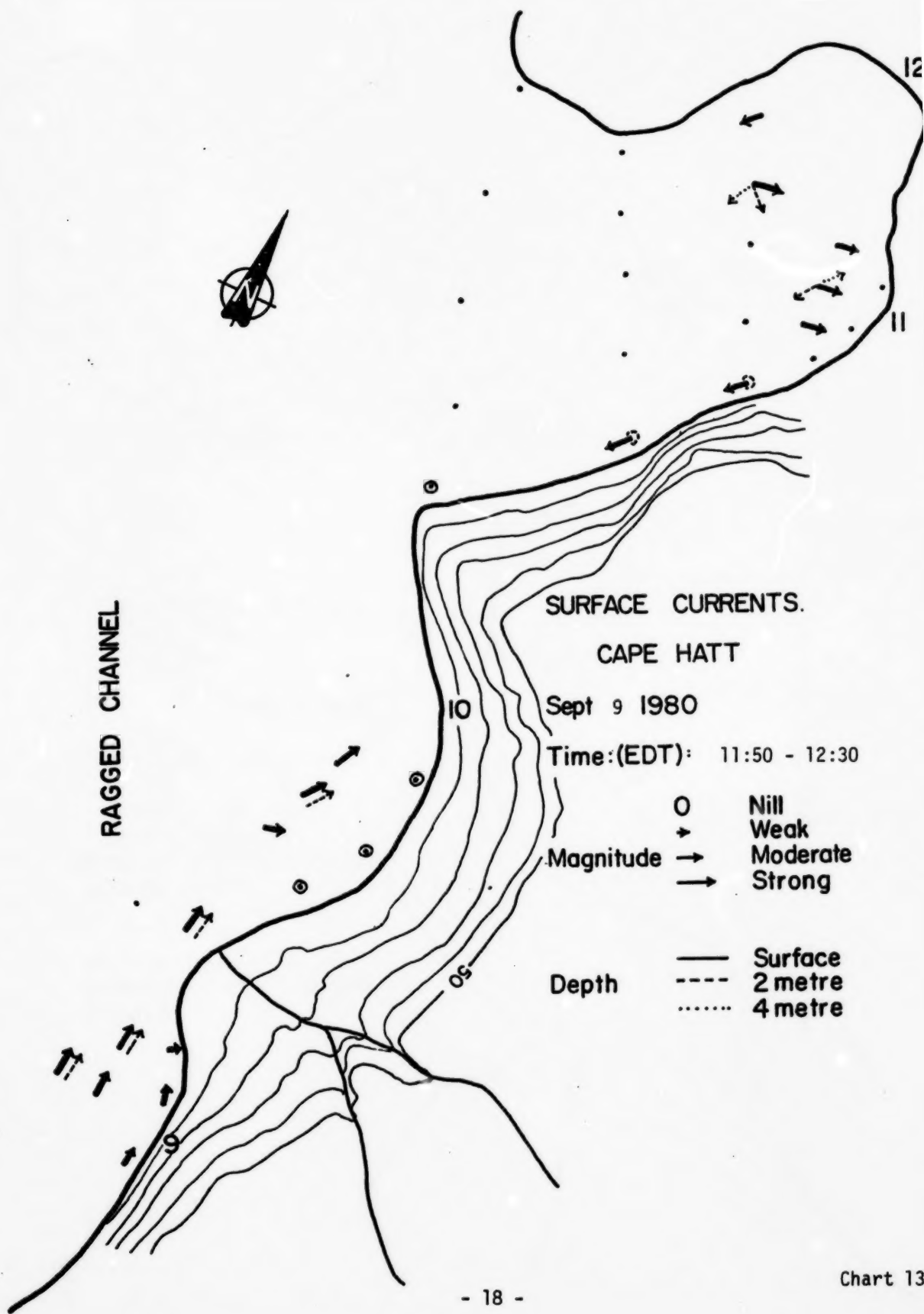
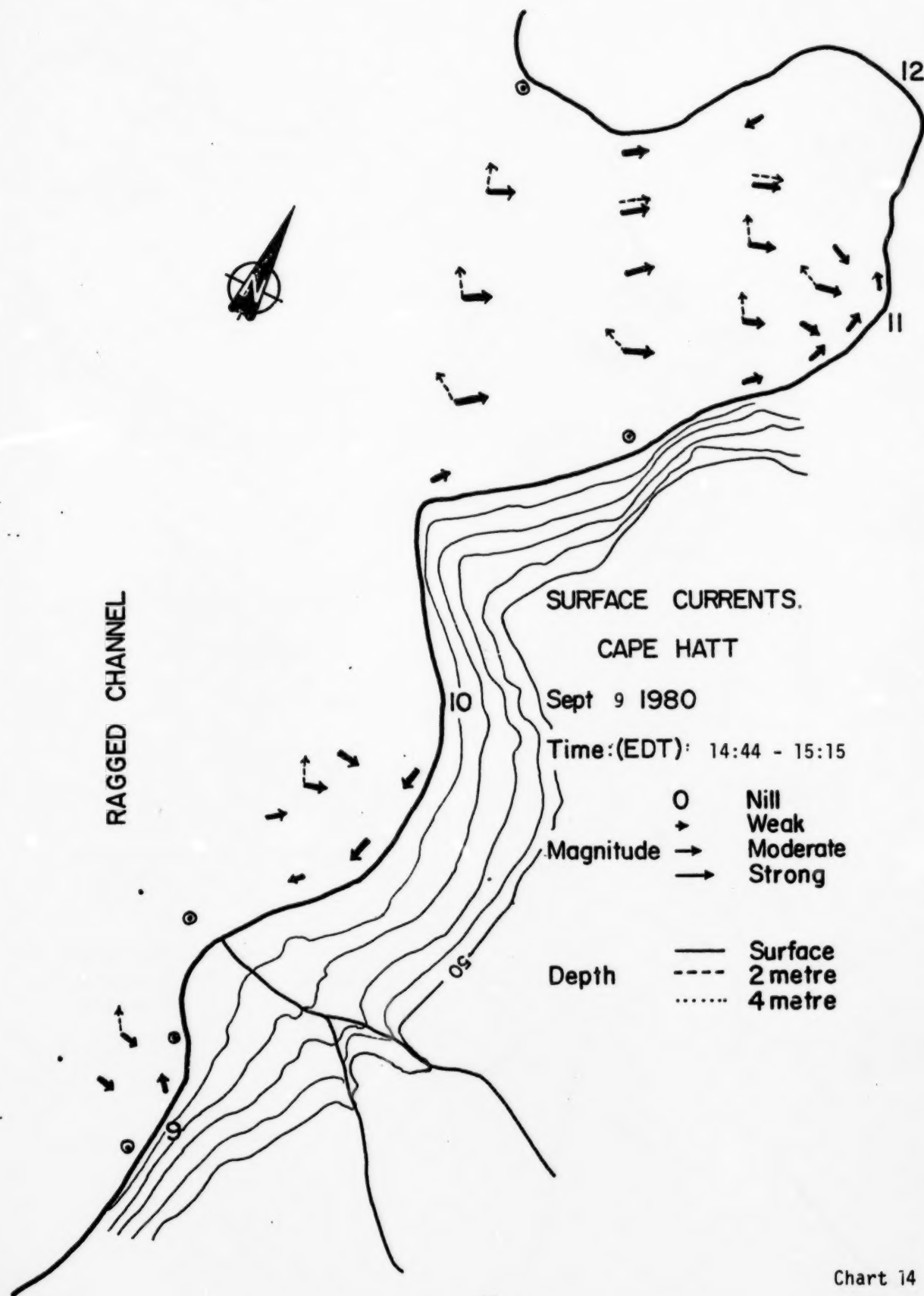
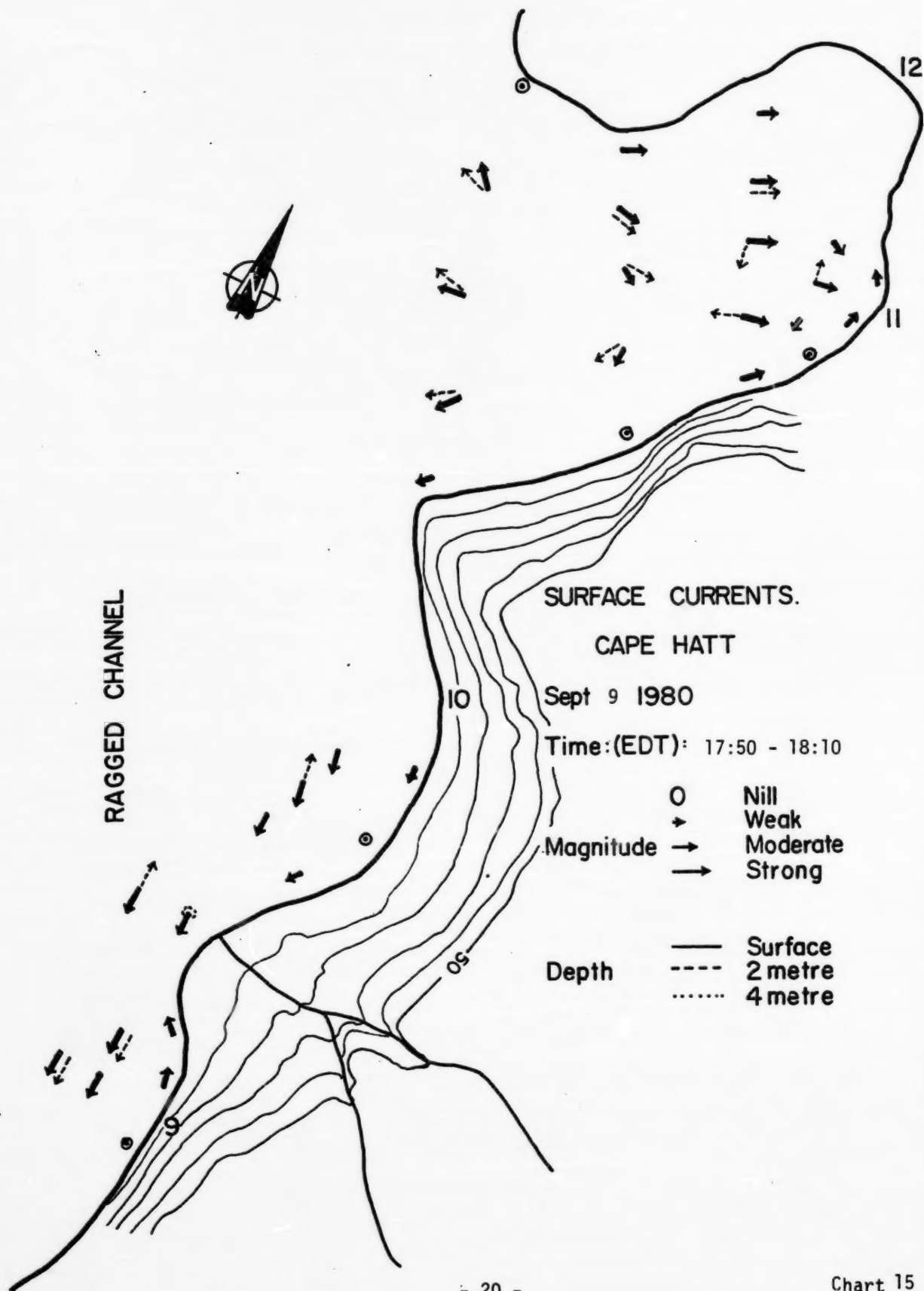
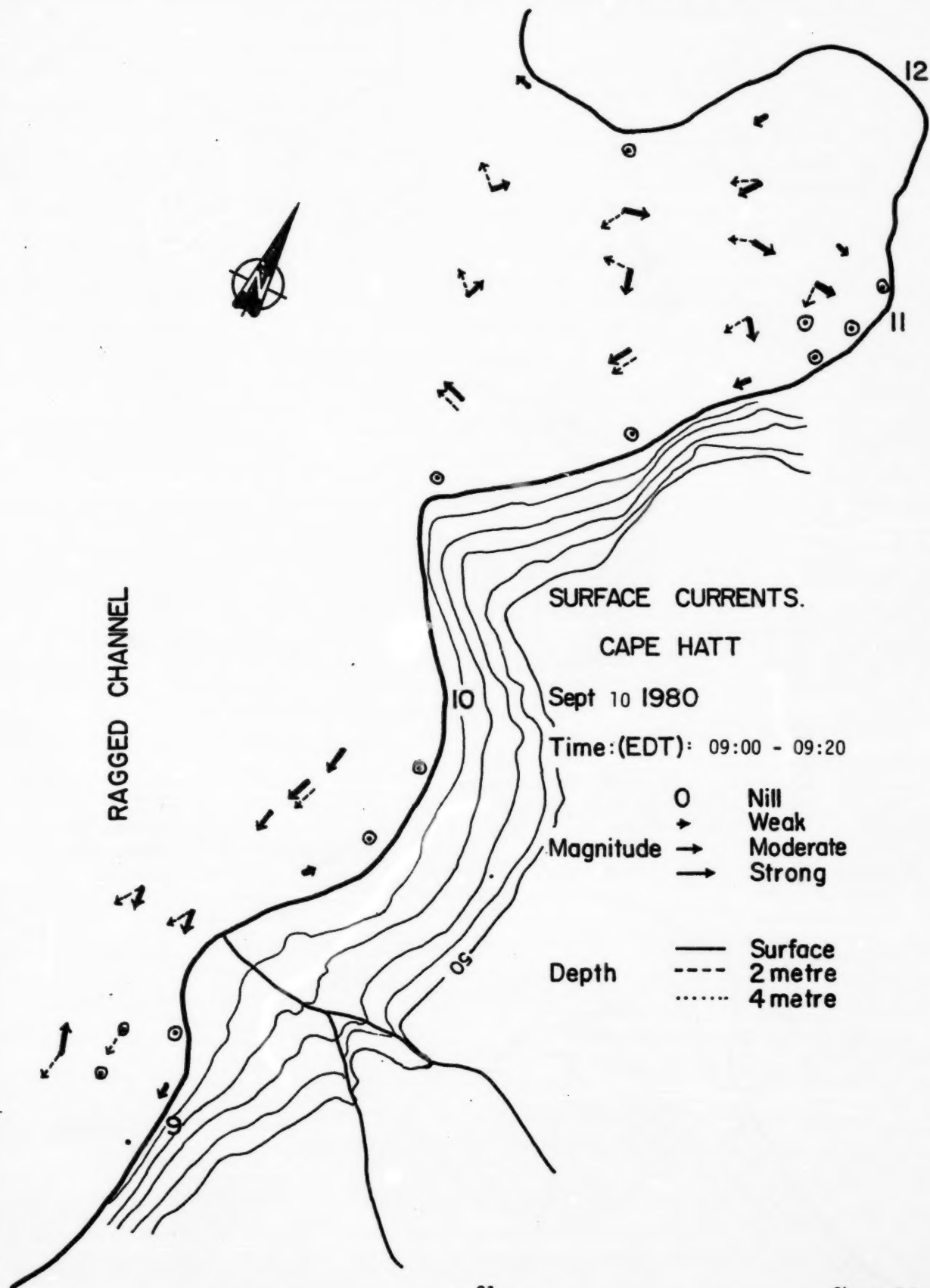


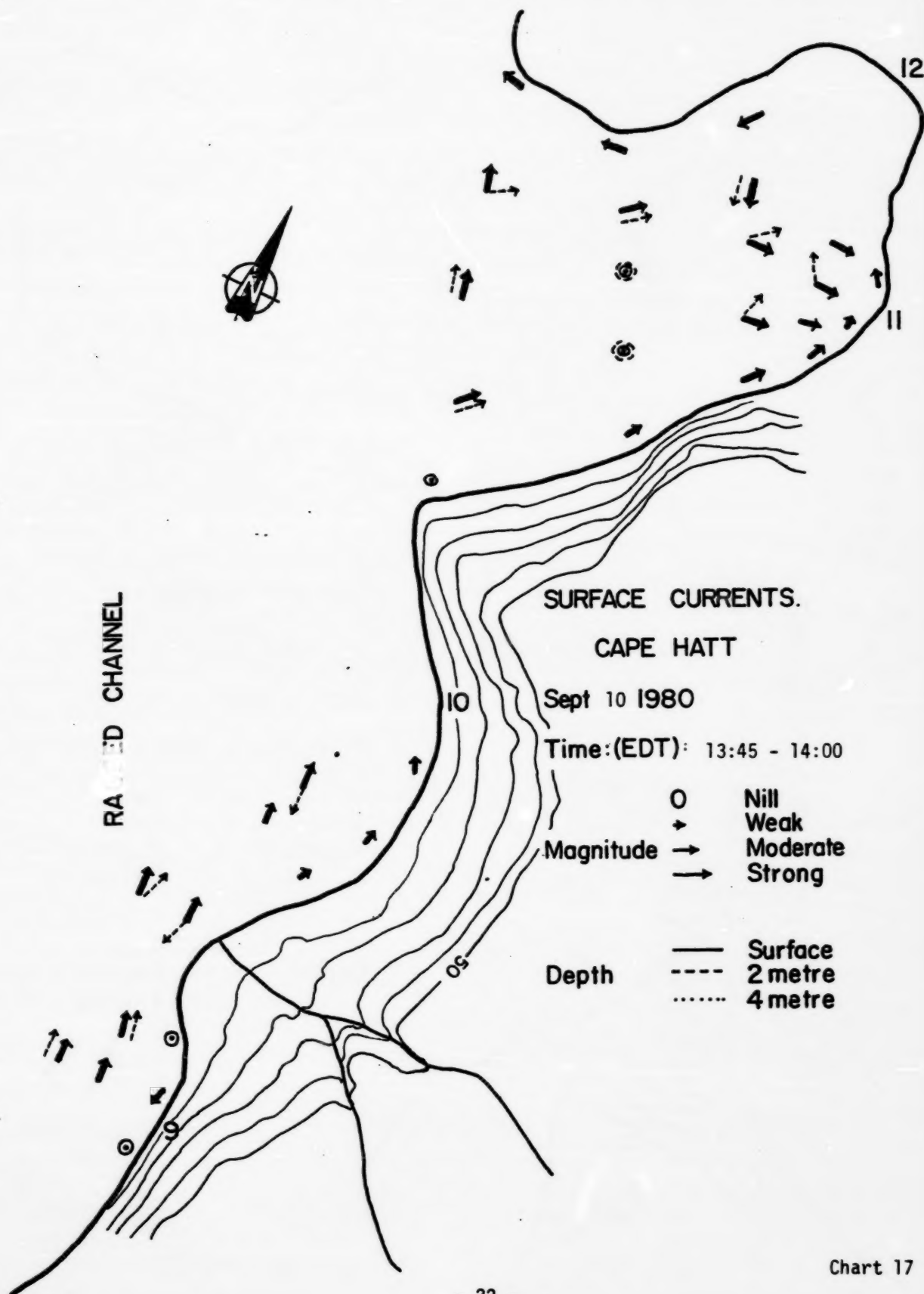
Chart 12











RAGGED CHANNEL



SURFACE CURRENTS.

CAPE HATT

Sept 10 1980

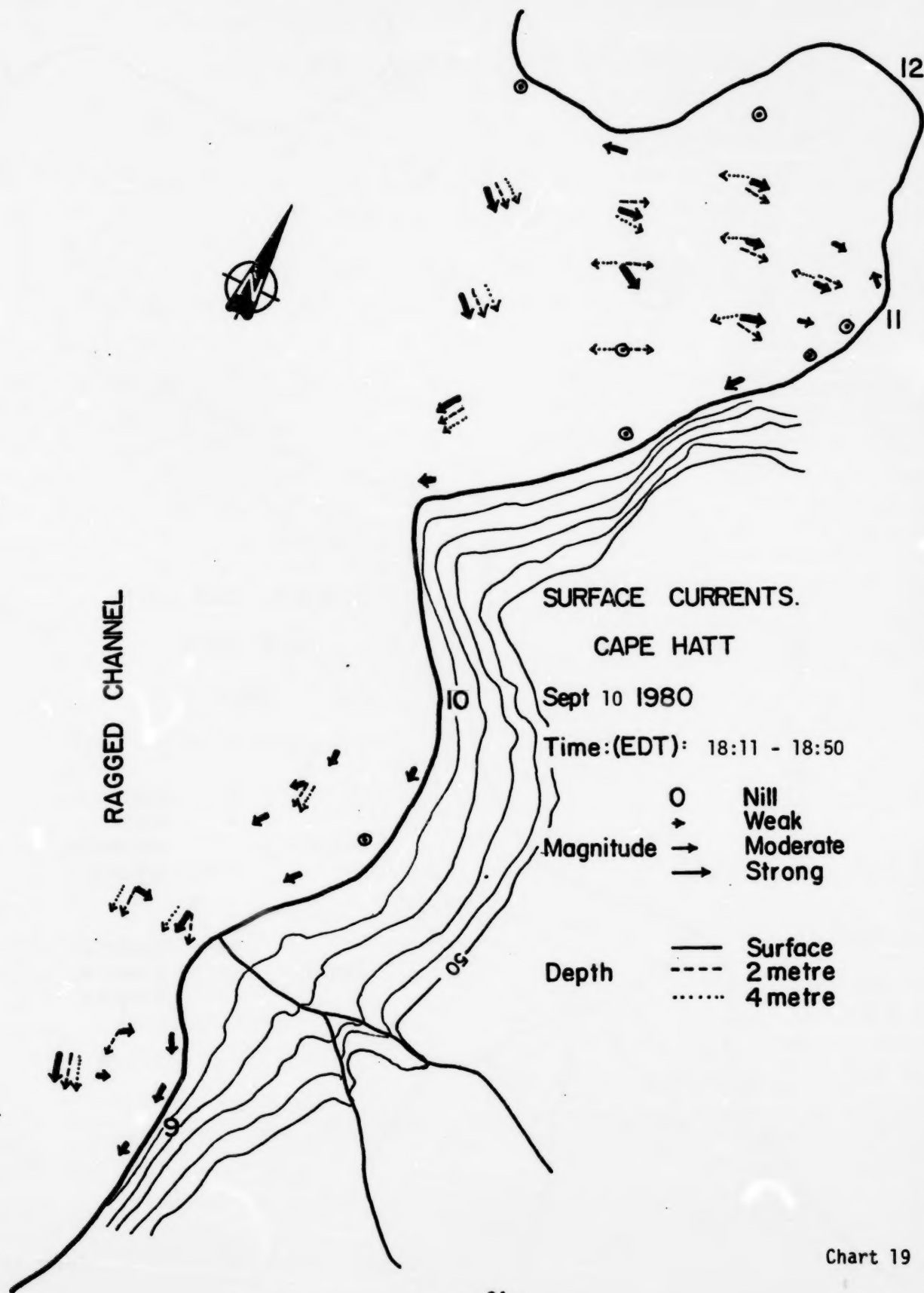
Time:(EDT): 14:49 - 15:09

Magnitude

0	Nil
→	Weak
→	Moderate
→	Strong

Depth

—	Surface
---	2 metre
.....	4 metre



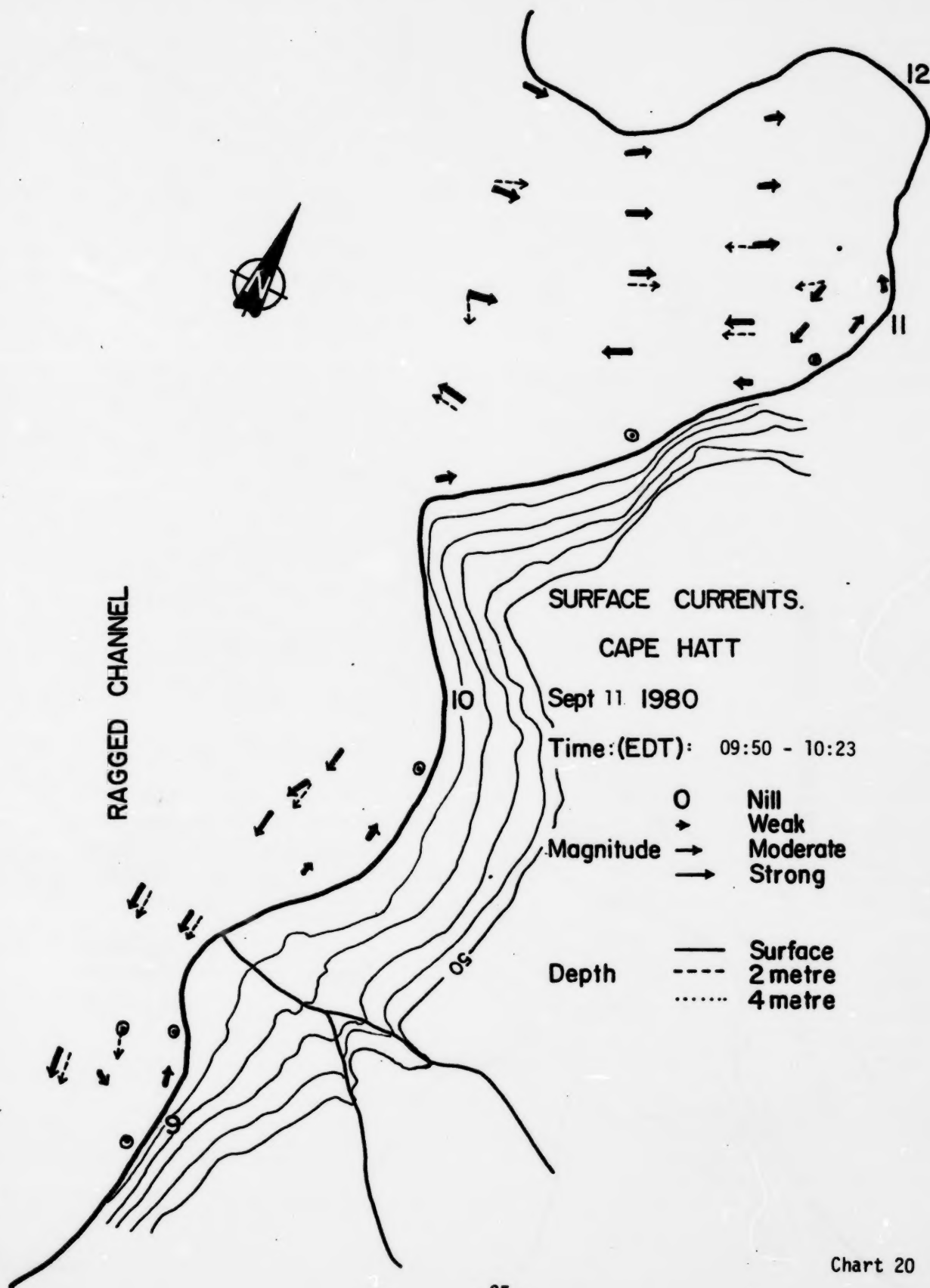
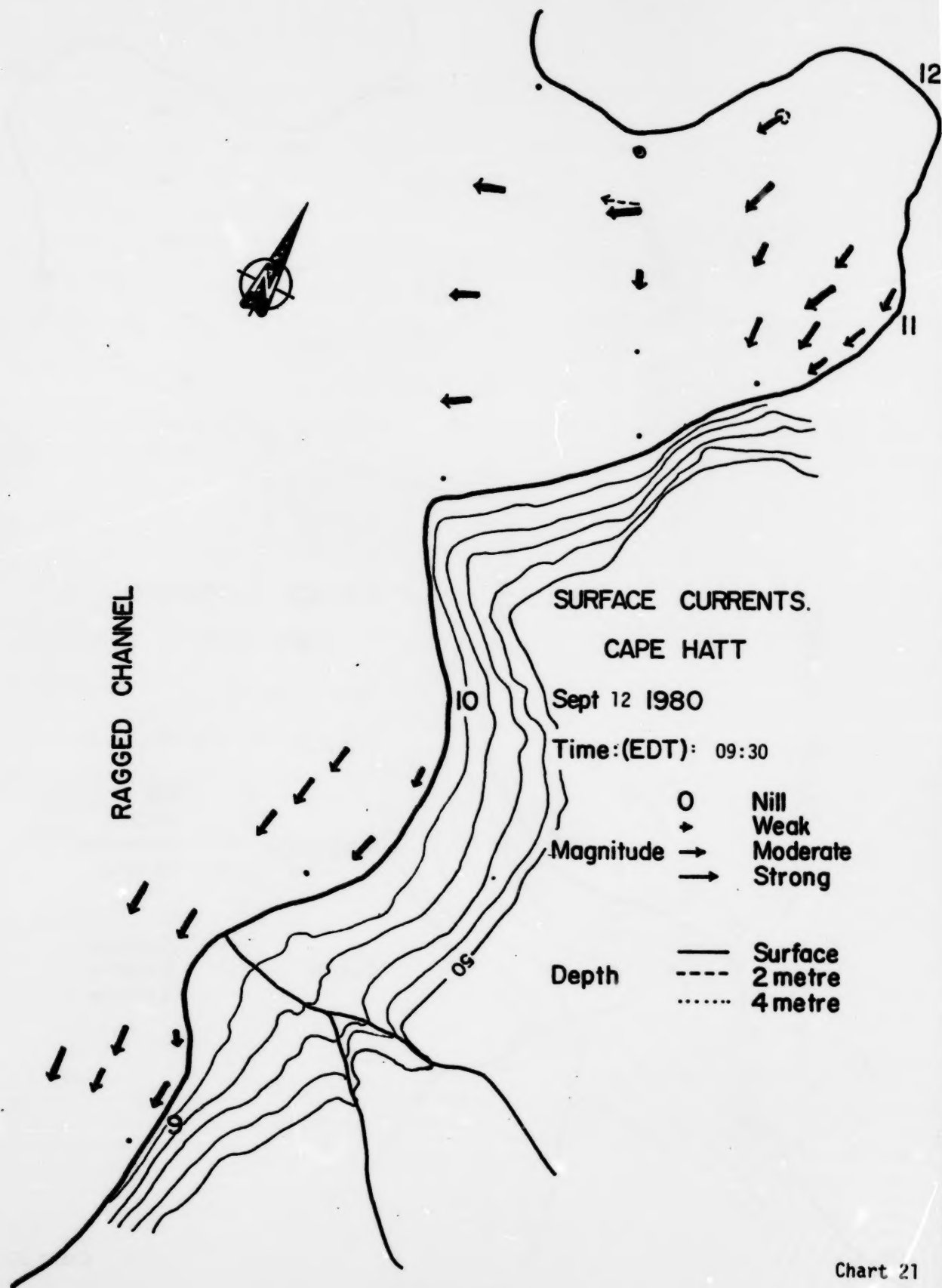
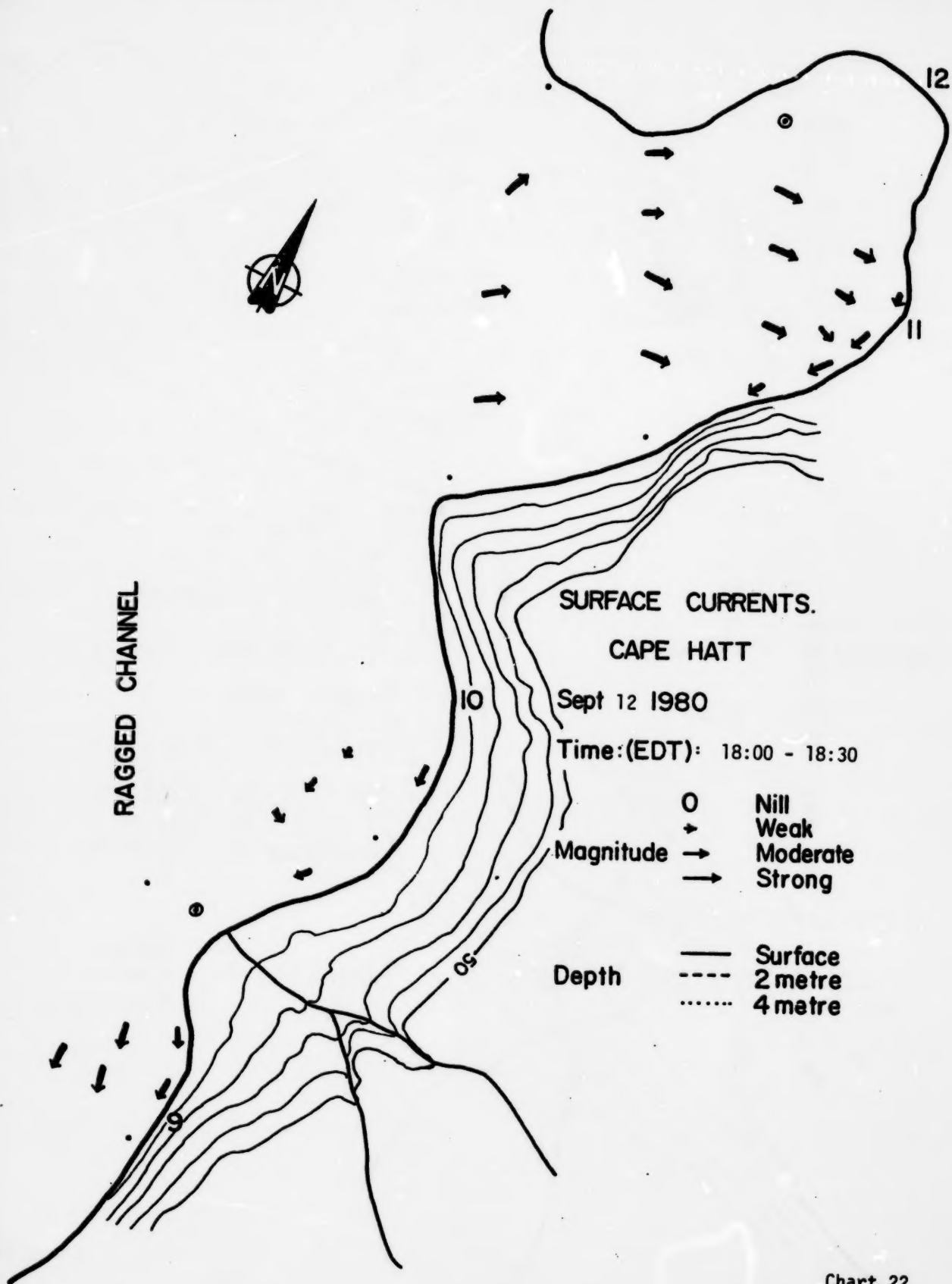
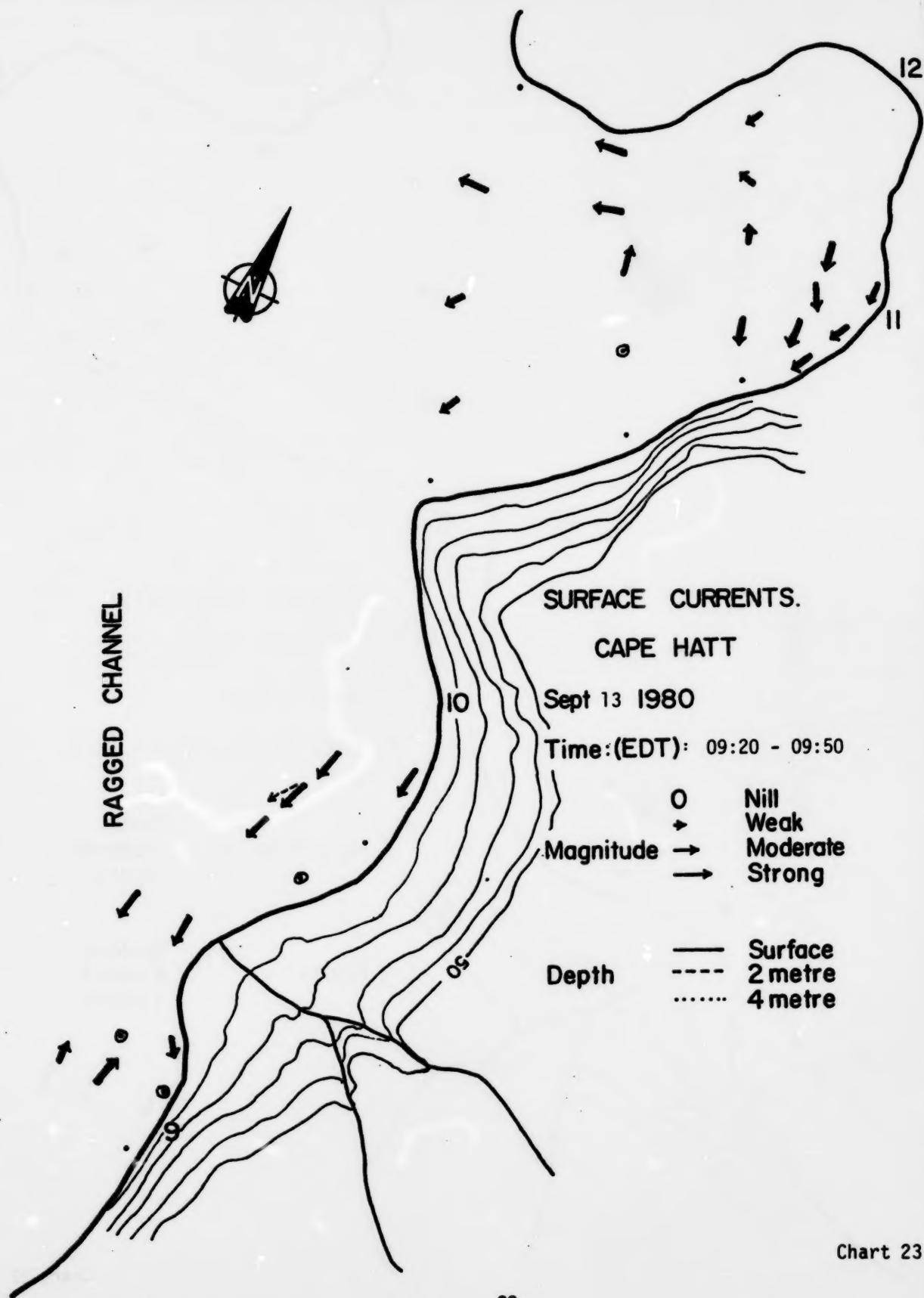


Chart 20







RAGGED CHANNEL

14:49

14:20

14:14

14:05

15:12

12

11

10

05

09

"SCUM LINE" TRAJECTORY

CAPE HATT

SEPT 10, 1980

TIME (ETD) : 14:05 - 15:12

WINDS - SEPT 10, STN 3

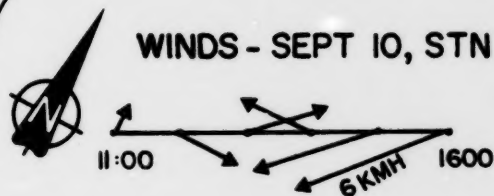


Chart 24